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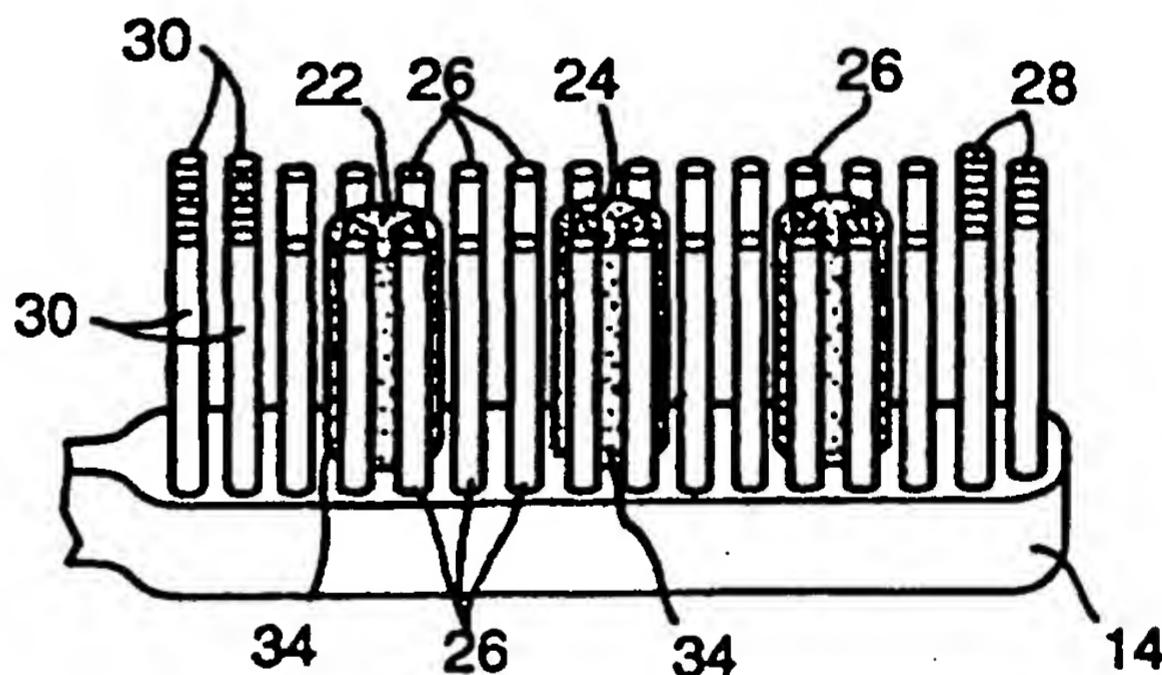
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(54) Title: PROPHY TOOTHBRUSH

(57) Abstract

A toothbrush (10) for cleaning and polishing teeth includes a handle (12) attached to a brush head (14). Attached to the brush head (14) is at least one prophy cup device (18, 34) for polishing teeth, and a plurality of bristle tufts (26, 28, 30) for scrubbing teeth, the bristle tufts (26, 28, 30) being attached to the brush head (14) and placed about the perimeter of each prophy cup device (18, 34).



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DESCRIPTIONProphy ToothbrushBackground of the Invention1. Field of Invention

This invention relates generally to toothbrushes used for the cleaning of teeth and gums.

5 2. Background Information

Cleaning of teeth is very important because unclean teeth are primarily responsible for the most common disease encountered in human and animal medicine -- gingivitis and periodontal disease (or periodontitis).  
10 Periodontal disease is a term used to describe diseases of the tooth attachment apparatus, the gums, tooth roots, bone surrounding the teeth, and the periodontal ligament tissue joining tooth to bone. Symptoms range from gum inflammation (gingivitis), formation of plaque (food and  
15 bacteria), and bad breath (halitosis), to serious accumulation of tartar (mineralized plaque), bleeding, receded or eroded gums, loose or infected teeth, and eventual loss of teeth. Periodontal disease is also the major cause of bad breath in human beings, dogs, and cats. If untreated,  
20 periodontal disease often leads to severe damage of major organ systems, and can shorten the life of the afflicted animal. Thus, teeth cleaning is essential to good health.

When teeth are cleaned by a dentist or dental hygienist, generally instruments such as scalers and curettes  
25 are used initially to clean the crown and subgingival (under the gums) portions of the tooth. After this cleaning has been performed, a prophylaxis polishing cup or "prophy cup", mounted on a low-speed dental handpiece is employed. The prophy cup is typically made of a soft  
30 rubber-like material and contains at least one central cavity portion that is loaded with pumice paste or another similar abrasive. The prophy cup is then held against the

surface of a tooth while being mechanically rotated, e.g., by the dental handpiece. This procedure forces the pumice abrade across the surface of the tooth, thereby polishing the tooth, leaving as smooth a surface as possible. A 5 smooth toothsurface helps reduce future plaque and calculus (tartar) build up. Plaque builds up within hours of tooth brushing and the smoother the surface of the tooth, the longer it takes for plaque to adhere to the tooth.

Normal dental hygiene is then continued outside of 10 the dental office and includes regular brushing of the teeth with a sh. This brushing typically occurs one to three times a day. Before brushing, toothpaste is placed on top of the bristles on the toothbrush. During brushing, the bristles of the toothbrush act to scrub the 15 teeth. The use of toothbrushes for dental hygiene has been described in U.S. Patent No. 4,738,001, which is incorporated herein by reference.

The above described conventional dental hygiene program suffers from a number of major disadvantages. 20 During the brushing process, the toothbrush bristles generally do not follow the contours of teeth as closely as the soft, rubber-like prophy cup. Therefore, the teeth are not left with a surface that is as smooth as desired and the detrimental early onset of periodontal disease is 25 encouraged.

Further, during the toothbrushing process, upon contact of toothpaste covered bristles with teeth, the toothpaste is spread into the mouth and between the toothbrush bristles, and does not concentrate its effect 30 directly on the teeth in contact bristles. Therefore, the toothpaste does not act as effectively as it could.

Also, often times conventional toothbrushes are designed with relatively thick bristles which can cause problems with sensitive gums and teeth. Since gingivitis 35 and periodontal disease often starts in the area below the gum line, the cleaning of this area is extremely important.

Therefore, a need was perceived for a toothbrush that would clean teeth and gums, and in the process leave the teeth with a smoother surface than conventional toothbrushes, make more effective use of toothpaste, and 5 improve the cleaning of the area below the gum line.

Summary of the Invention

The present invention is directed to a toothbrush that satisfies the foregoing need for improved dental cleaning. A toothbrush having features of the present 10 invention comprises a platform upon which to mount a prophy cup device and bristle tufts. In the preferred embodiment, the platform comprises a handle having a longitudinal axis, and a brush head, the brush head being attached to the handle. At least one prophy cup device 15 made of a flexible, rubber-like material is attached to the brush head. The sides of the prophy cup device extend from the head. The prophy cup device has at least one central cavity portion allowing for placement of tooth cleaning material, such as toothpaste, in at least one 20 central cavity. The soft rubber-like prophy cup device follows the contours of teeth more effectively than bristles, and provides for polishing of the teeth. Each central cavity portion of the prophy cup device holds more toothpaste for a longer period of time than a conventional 25 toothbrush, providing for more effective use of the toothpaste. In the preferred embodiment, the prophy cup device contains vanes extending from the sides of the prophy cup device into each central cavity and the prophy cup device generally has a shape similar to the brush head.

30 Also secured to the brush head is a plurality of bristle tufts. Each bristle tuft comprises a plurality of individual bristles. The bristle tufts are spaced apart and are placed about the perimeter of the prophy cup device. The bristle tufts also extend from the brush head 35 to above the prophy cup device. This arrangement of bristle tufts and the prophy cup device provides for both

bristles that scrub the surface of and in between teeth, as well as a soft rubber-like element that polishes and smoothes the surface of the teeth. In the preferred embodiment, the individual bristles are made of a synthetic material, preferably nylon, and are approximately 0.005 to 0.006 inches in diameter to ensure softness when in contact with the gums, and to clean the area under the gums. These bristles are soft and are less likely to cause pain to sensitive gums than thicker bristles.

In another inventive aspect of the preferred embodiment, some of the bristle tufts are arranged such that a single row of lateral bristle tufts is placed about, and substantially symmetrical to, each side of the prophy cup device, along lines substantially parallel to the longitudinal axis of the handle. Additionally, a cluster of trailing bristle tufts is placed on the end of the brush head most distal from the handle, both of these clusters extending towards the prophy cup device. The leading and trailing bristle tufts are longer than the lateral bristle tufts. This positioning and extra length of the leading and trailing tufts allows these tufts to advance and follow between teeth. The leading bristle tufts, being longer, will also aid in more effective cleaning of the most candal (posterior) teeth, which can be difficult to reach with a toothbrush.

Accordingly, it is an object of the present invention to provide an improved toothbrush for scrubbing and polishing of teeth and the cleaning of gums. Other and further objects and advantages will appear hereinafter.

### 30 Brief Description of the Drawings

It is to be understood that the accompanying drawings are provided for the purpose of illustration only, and are not intended as a definition of the limits of the invention. The drawings schematically illustrate a preferred embodiment of the present invention in which:

FIG. 1 is a top plain view of a prophy toothbrush in accordance with the preferred embodiment;

FIG. 2 is a partial cutway side elevation view of the prophy toothbrush in accordance with the preferred embodiment, illustrating the positioning of a prophy cup device relative to a cluster of leading bristle tufts and a cluster of trailing bristle tufts;

FIG. 3 is a side elevation view of the prophy toothbrush in accordance with the preferred embodiment, illustrating the positioning of a row of lateral bristle tufts relative to the leading bristle tufts and trailing bristle tufts, as well as the prophy cup device.

FIG. 4 is a top plan view of a prophy toothbrush, illustrating an embodiment of the prophy toothbrush employing substantially cylindrical shaped prophy cup devices.

FIG. 5 is a partial cutaway perspective view of the prophy toothbrush of FIG. 4 illustrating the substantially cylindrical shaped prophy cup devices.

20 Detailed Description of the Preferred Embodiment

Referring to the drawings, FIG. 1 shows a toothbrush 10, comprised of a handle 12, and a brush head 14 connected to the handle. The handle 12 is relatively long and narrow, allowing it to be easily manipulated. The 25 handle has a longitudinal axis 16. In the preferred embodiment, the brush head 14 is of a generally rectangular shape. It would be apparent to one skilled in the art however, that the brush head 14 could be formed in other shapes such as trapezoids, ovals, and circles.

30 Secured to the brush head 14 is a prophy cup device 18. The up device 18 is made of a soft, flexible rubber, or rubber-like material. In the preferred embodiment the prophy cup 8 is generally of a similar shape to the brush head 14, that shape being generally rectangular. The 35 prophy cup device 18 also has 20 sides extending from the brush head 14. The prophy cup device 18 also has at least

one central cavity portion 22 into which toothpaste or other tooth cleaning material may be placed.

In the preferred embodiment, the prophy cup device 18 also contains a plurality of vanes 24 extending from the 5 sides 20 of the prophy cup device 18 into at least one central cavity portion 22. These vanes 24 serve to retain tooth cleaning material and increase the cleaning surface area of the prophy cup device 18. These vanes 24 also add structural stability to the prophy cup device 18. The use 10 of vanes, or "ribs" as they are sometimes characterized, in prophy cups has been described in U.S. Patents 4,929,180 and 5,348,473, which are incorporated herein by reference.

In the preferred embodiment, one prophy cup device 18 15 of a generally rectangular shape is employed. As shown in FIG. 1, the rectangular prophy cup device 18 is divided into a number of smaller rectangular sections 32, each of these sections having a central cavity portion 22. However, the invention may be made with other configurations 20 of prophy cup devices 18. For example, one or more prophy cup devices 18 may be used to provide the advantages of the prophy cup device 18, i.e., retaining tooth cleaning material and increasing the surface area contact- 25 ing teeth. FIG. 4 and FIG. 5 illustrate the use of three substantially cylindrical shaped prophy cup devices 34 instead of a single substantially rectangular shaped prophy cup device. In embodiment shown, the substantially cylindrical shaped prophy cup devices 34 also contain vanes 24 and central cavity portions 22. In alternative 30 embodiments (not shown), substantially conical shaped prophy devices could be employed as well.

As shown in FIG. 1, also secured to the brush head 14 are a plurality of bristle tufts. The bristle tufts are placed around the perimeter of the sides 20 of the prophy 35 cup device 18. Each bristle tuft is composed of a plurality of individual bristles (not shown). In the preferred embodiment, these individual bristles are made of syn-

thetic material, preferably nylon, and are approximately 0.006 to 0.0006 inches in diameter. This bristle diameter allows the bristles to bend easily and causes the bristles to be gentle on the gum.

5 In the preferred embodiment, some bristle tufts are placed such that a row of lateral bristle tufts 26 is placed about and substantially symmetrically to sides of the prophy cup device 18, along lines substantially parallel to the longitudinal axis 16 of handle 12. As 10 shown in FIG. 3, these lateral bristle tufts 24 extend above the prophy cup device 18, the amount of extension approximately 1.5 to 2 millimeters. Thus, the lateral tufts 26 contact and scrub teeth during brushing before the prophy cup device 18 contacts the teeth.

15 Additional bristle tufts are placed on ends of the brush both most proximal to and most distal from the handle 12. Leading bristle tufts 28 are placed distal from the handle 12, and, as shown in FIG. 3, extend above the lateral bristle tufts 26. Trailing bristle tufts 30 20 placed proximal to the handle 12, also extend above the lateral bristle tufts 26. Of course, as shown in FIG. 2, both the leading bristle tufts 28 and trailing tufts 30 extend above the prophy cup device 18.

To facilitate a greater understanding of the advantages of the illustrated preferred embodiment, operation of the toothbrush 10 is set forth as follows. To perform brushing, toothpaste or other tooth cleaning material is first placed so that it covers both the prophy cup device 18 and bristle tufts. Then, typically while holding the 25 handle 12, the bristle tufts, lateral 26, leading 28, and trailing 30, are pressed against the teeth, and moved in a conventional tooth brushing manner. The bristle tufts scrub the surface of the teeth and between teeth. The leading tufts 28 and trailing bristle tufts 30, being 30 longer than the lateral bristle tufts 26, advance and follow between teeth, and are of special utility in cleaning the harder to reach posterior teeth. As the tooth-

brush 10 is pressed harder against the teeth, the prophy cup device 18 presses against the teeth, following the contour of the teeth, applying toothpaste to the teeth and thereby polishing the teeth. Thus, the combination of 5 scrubbing and polishing the teeth provides a smoother, cleaner surface than is provided by some other means. Additionally, the sides 20 of the prophy cup device 18 synergistically cooperate with the bristle tufts, tending to force lateral bristle tufts 26 away from the prophy cup 10 18 and towards and under the gum line, cleaning under the gum line.

Thus, an innovative prophy tooth brush, and a method for using the same have been disclosed. While variations of the illustrated preferred embodiment have been shown 15 and described, it would be apparent to those skilled in the art that many more modifications are possible without departing from the inventive concepts herein. For example, instead if mounting the prophy cup device 18 and bristle tufts on a brush head 14 connected to a handle 12, 20 the prophy cup device 18 and bristle tufts could be mounted to a platform (not shown) without a handle 12. Further, the bristle tufts could be placed in various arrangements on the platform or brush head 14. For example, instead of being placed about the prophy cup 25 device 18, the bristle tufts could be placed on just one side of the prophy cup device 18. The invention, therefore, is not to be restricted except in the spirit of the appended claims.

I claim:

1. A toothbrush for cleaning teeth and below gum line, the toothbrush comprising:
  - (a) a platform;
  - 5 (b) at least one prophy cup device secured to the platform, each prophy cup device comprising
    - (1) sides extending from the brush head, and
    - (2) at least one central cavity portion allowing for placement of tooth cleaning material therein; and,
  - 10 (c) a plurality of bristle tufts secured to the platform, the bristle tufts comprising a plurality of individual bristles, for closely following and cleaning the surface of teeth cleaning under the gumline.
2. A toothbrush as claimed in claim 1 wherein each prophy cup device further comprises a plurality of vanes extending from the sides of each prophy cup device into each central cavity of each prophy cup device for retaining tooth cleaning in each prophy cup device and for providing additional cleaning surface area in each prophy 20 cup device.
3. A toothbrush as claimed in claim 1 wherein each prophy cup device is of substantially rectangular shape.
4. A toothbrush as claimed in claim 1 wherein each prophy cup device is made of flexible rubber-like 25 material.
5. A toothbrush as claimed in claim 1 wherein the least one prophy cup device comprises a single prophy cup device.
6. A toothbrush as claimed in claim 1 wherein each 30 prophy cup device is of substantially cylindrical shape.

7. A toothbrush as claimed in claim 1 wherein each prophy cup device os of substantially conical shape.

8. A toothbrush as claimed in claim 1 wherein the individual bristles are made of nylon.

5 9. A toothbrush as claimed in claim 1 wherein the bristle tufts are placed at least about a portion each prophy cup device.

10. A toothbrush as claimed in claim 1 wherein the bristle tufts extend above each prophy cup device.

10 11. A toothbrush for cleaning teeth and below the gum line, the toothbrush comprising:

- (a) a handle;
- (b) a brush head connected to the handle;
- (c) at least one prophy cup device secured to the  
15 brush head, each prophy cup device comprising
  - (1) sides extending from the brush head, and
  - (2) at least one central cavity portion allowing for placement of tooth cleaning material therein; and
- (d) a plurality of bristle tufts secured to the  
20 brush head, the bristle tufts comprising a plurality of individual bristles, and being placed at least about a portion of the perimeter of each prophy cup device for closely following and cleaning the surface of teeth and for cleaning under the gumline.

25 12. A toothbrush as claimed in claim 11 wherein each prophy cup device further comprises a plurality of vanes extending from the sides of each prophy cup device into central cavity portion of each prophy cup device for retaining tooth cleaning material and for providing additional cleaning surface area in each prophy cup device.

13. A toothbrush as claimed in claim 11 wherein each prophy cup device is of substantially rectangular shape.

14. A toothbrush as claimed in claim 11 wherein each prophy cup device is made of flexible rubber-like material.

15. A toothbrush as claimed in claim 11 wherein at least one prophy cup device comprises a single prophy cup device.

16. A toothbrush as claimed in claim 11 wherein each prophy cup device is of substantially cylindrical shape.

17. A toothbrush as claimed in claim 11 wherein each prophy cup device is of substantially conical shape.

18. A toothbrush as claimed in claim 11 wherein the individual bristles have a diameter in the range of 0.005 to 0.006 inches to ensure softness when in contact with gums and to clean below the gum line.

19. A toothbrush as claimed in claim 11 wherein the bristle tufts comprise:

(a) a plurality of leading bristle tufts positioned from the handle; and

(b) a plurality of trailing bristle tufts positioned proximal to the handle.

(c) a plurality of lateral bristle tufts positioned between the leading bristle tufts and the trailing bristle tufts, the leading bristle tufts and trailing bristle tufts being longer than the lateral bristle tufts for effective cleaning of teeth which are difficult to reach with the toothbrush.

20. A toothbrush as claimed in claim 11 wherein the individual bristles are made of nylon.

21. A toothbrush as claimed in claim 11 wherein the bristle tufts extend above each prophy cup device.

22. A toothbrush for brushing teeth and gums of human and animals, the toothbrush comprising:

5 (a) a long and narrow handle having a longitudinal axis;

(b) a brush head connected to the handle, the brush head having an end proximal to the handle and an end distal from the handle;

10 (c) prophy cup device, made of flexible rubber-like material, secured to the brush head, the prophy cup device comprising

(1) sides extending from the brush head,

15 (2) a central cavity portion allowing for placement of tooth cleaning material therein, and

(3) a plurality of vanes extending from the sides of the prophy cup device into the central cavity portion;

20 (d) a plurality of lateral bristle tufts secured to the brush head, the lateral bristle tufts comprising a plurality of individual nylon bristles, the lateral bristle tufts extending above the prophy cup device and placed in at least one row on the sides of the prophy cup device along lines parallel to the longitudinal axis of the handle;

25 (e) a plurality of leading bristle tufts secured to the brush head, the leading bristle tufts comprising a plurality of individual nylon bristles, the leading bristle tufts extending above the lateral bristle tufts and placed on the end of the brush head distal from the handle; and

30 (f) a plurality of trailing bristle tufts secured to the brush head, the trailing bristle tufts comprising a plurality of individual nylon bristles, the trailing bristle tufts extending above the lateral bristle tufts and placed on the end of the brush head proximal to the handle.

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23. A process for brushing teeth and gums of human beings and animals, the steps of the process comprising

(a) obtaining a toothbrush, the toothbrush comprising

5 (1) a platform;

(2) at least one prophy cup device secured to the platform, each prophy cup device comprising

(i) sides extending from the brush head, and

(ii) at least one central cavity portion for allowing

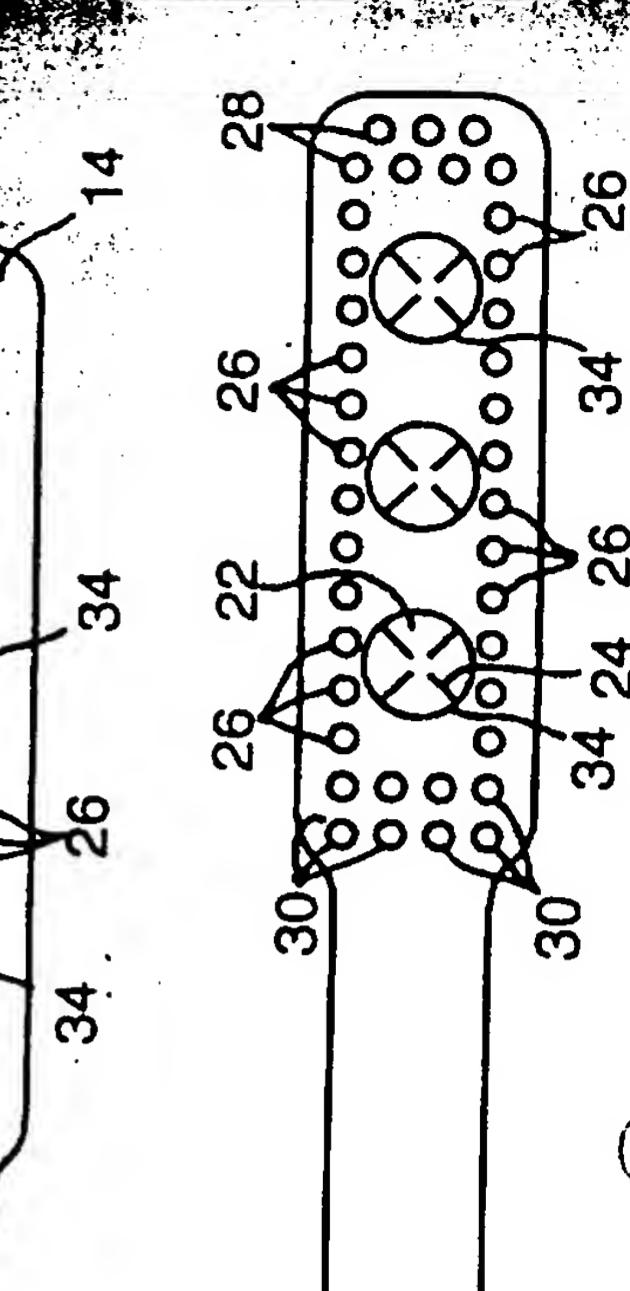
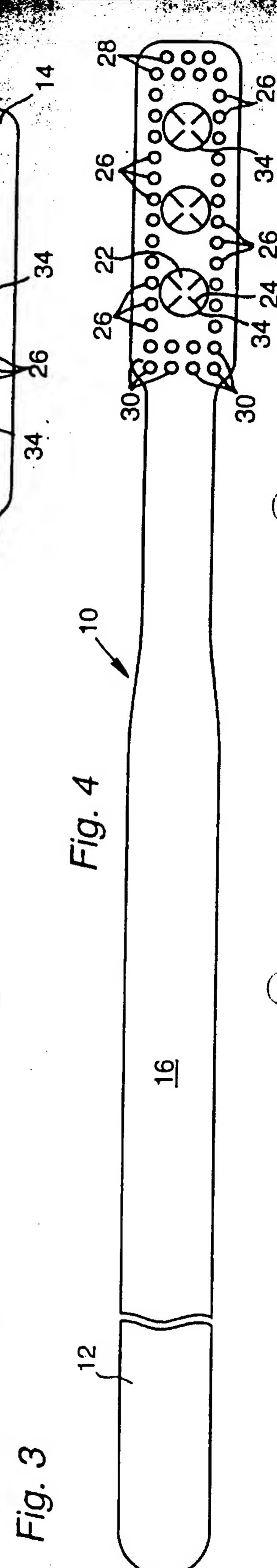
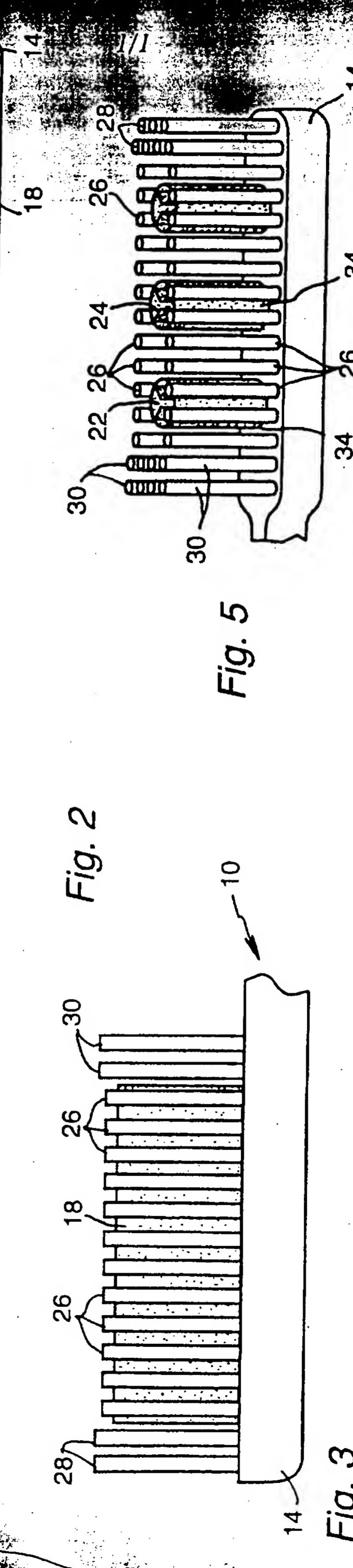
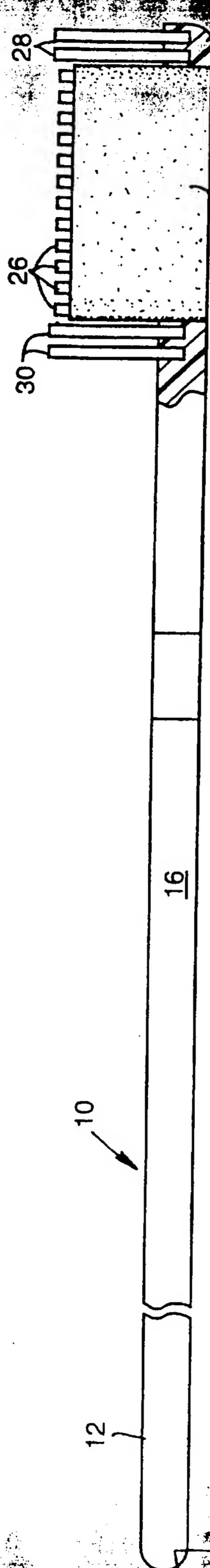
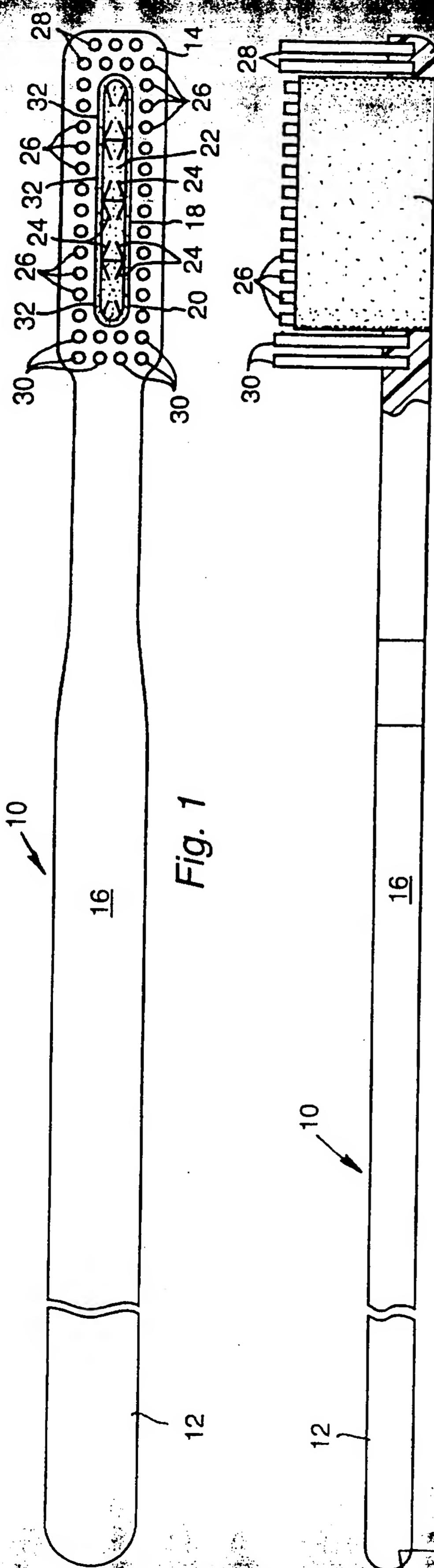
10 for placement of tooth cleaning material therein; and,

(3) a plurality of bristle tufts secured to the platform, the bristle tufts comprising a plurality of individual bristles, for closely following and cleaning the surface of teeth and for cleaning under the gumline of

15 teeth; the process further comprising the steps of:

(b) placing tooth cleaning material in each prophy cup device and bristle tufts;

(c) pressing each prophy cup and the bristles tufts against the teeth and brushing the teeth.



## INTERNATIONAL SEARCH REPORT

International application No.

PCT/US95/16318

## A. CLASSIFICATION OF SUBJECT MATTER

IPC(6) : A61C 15/00, A46B 9/04

US CL : 433/216.1; 15/110, 167.1-188, Dig. 5; 601/141

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 433/216.1; 15/110, 167.1, 167.2, 186-188, Dig. 5; 401/268; 601/139, 141

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

NONE

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

NONE

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US, A, 1,268,544 (CATES) 04 June 1918, see entire document.	1,4,9,11,14 -----
Y		6,7,16,17, 23
X	US, A, 2,312,828 (ADAMSSON) 02 March 1943, see figure 6 and page 1, lines 48-55.	1,3-5,9-11, 13-15,21 -----
Y		2,8,12,18, 20,23
Y	US, A, 1,965,009 (STEVENS) 03 July 1934, see figure 6.	7,17
Y	US, A, 2,545,814 (KEMPSTER) 20 March 1951, see entire document.	2,12

 Further documents are listed in the continuation of Box C.

See patent family annex.

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International application No.

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## C (Continuation). DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US, A, 3,007,441 (EYER) 07 November 1961, see entire document.	6,16
Y	US, A, 4,053,959 (WILEY) 18 October 1977, see entire document.	8,18,20
A	US, A, 1,188,823 (PLANK) 27 June 1916.	
A	US, A, 1,598,224 (VAN SANT) 31 August 1926.	
A	US, A, 2,059,914 (ROSENBERG) 03 November 1936.	
A	FR, A, 642,228 (ROUTURIER) 24 August 1928.	